

A new brown *Polyommatus* (*Agrodiaetus*) from northern Greece (Lepidoptera: Lycaenidae)

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Abstract. A new species of brown *Agrodiaetus* is described from northern Greece on the basis of its chromosome number, its karyotype, and its external characters. The new species-group taxon, so far known only from a single restricted area situated in the district of Dráma, appears to be closest to the *aroaniensis* species-group complex.

Samenvatting. Een nieuwe, bruine *Polyommatus* (*Agrodiaetus*)-soort uit Noord-Griekenland (Lepidoptera: Lycaenidae)

De beschrijving van een nieuwe, bruine *Agrodiaetus*-soort uit Noord-Griekenland is gebaseerd op het chromosoomnummer, het karyotype en de uiterlijke kenmerken. Deze nieuwe soort, tot nu toe uitsluitend bekend uit een beperkt gebied in het district Dráma, blijkt het nauwst verwant te zijn met de *aroaniensis* soortengroep.

Résumé. Une espèce nouvelle, brune, de *Polyommatus* (*Agrodiaetus*) du nord de la Grèce (Lepidoptera: Lycaenidae)

La description d'un *Agrodiaetus* brun, nouveau, du nord de la Grèce est basée sur le nombre des chromosomes, le caryotype et les caractères extérieurs. Ce taxon nouveau, qui est jusqu'à maintenant seulement connu d'un endroit restreint dans le district Dráma, appartient au groupe-espèces d'*aroaniensis*.

Key words: Lycaenidae – *Polyommatus* – *Agrodiaetus* – *Polyommatus* (*Agrodiaetus*) *eleniae* sp. nov. – karyotype – chromosome number – Greece

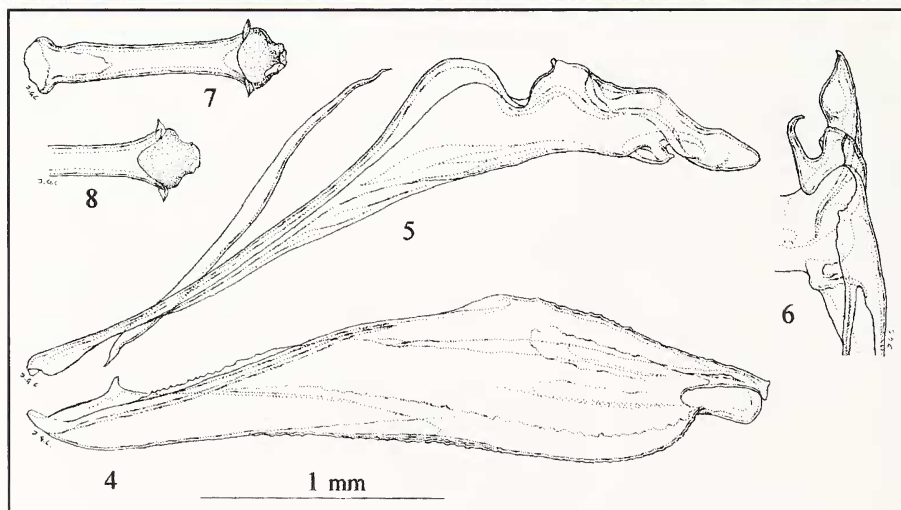
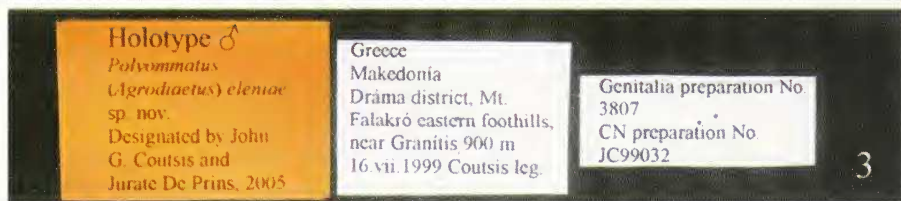
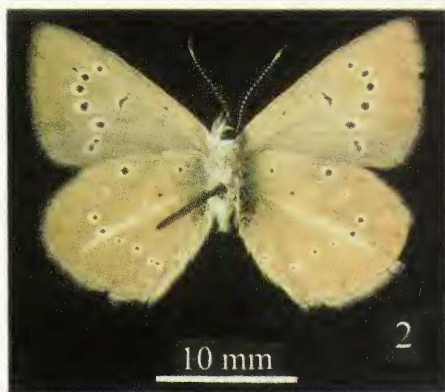
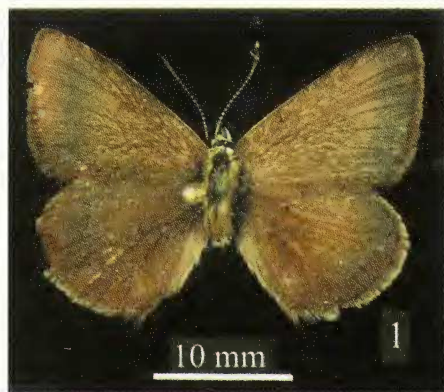
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Introduction

During a series of expeditions that were carried out by the first author on Mt. Falakró and its surrounding foothills (northern Greece, Makedonía, Dráma district – Fig. 22), a small number of a brown *Polyommatus* (*Agrodiaetus*) were recorded which, on the basis of their general external features and of their male genitalia, were at first attributed to *Polyommatus* (*Agrodiaetus*) *aroaniensis* (Brown, 1976). The fact, however, that the recorded individuals exhibited a darker, redder and warmer-appearing yellow-brown underside ground-colour (especially evident in fresh individuals), than is the case in nominotypical *aroaniensis*, prompted us to consider having their chromosome number and karyotype checked; this task was undertaken by the second author, and the results showed that these specimens represent a new and as yet un-described species, that fits within the *aroaniensis* species-group complex.

Abbreviations:	ZMA	Zöologisch Museum, Universiteit van Amsterdam
	TL	Type locality
	FW	Forewing
	HW	Hind-wing
	MI	Metaphase of first division of primary spermatocyte
	MII	Metaphase of second division of primary spermatocyte
	<i>n</i>	Haploid chromosome number
	ssp.	Subspecies



Figs. 1–8. *Polyommatus (Agrodiaetus) eleniae* sp. nov. holotype ♂. 1.– Upper-side. 2.– Underside. 3.– Data labels. 4–8. Genitalia. 4.– Side view of outer face of left valva. 5.– Side view of left face of genitalia with valvae and aedeagus removed. 6.– Ventral view of right falx, right labis and right half of tegumen. 7.– Dorsal view of aedeagus. 8.– Ventral view of distal half of aedeagus.

Polyommatus (Agrodiaetus) eleniae sp. nov.

Material. Holotype ♂ (Figs. 1, 2), Greece. Makedonia, Dráma district, Mt. Falakró, eastern foothills, near Granitis, 900 m, 16.vii.1999, Coutsis leg., coll. ZMA. ♀ paratype (Figs. 10, 11), Makedonia, Dráma district, Mt. Falakró, 1200–1300 m, 10.vii.1993, Coutsis leg., coll. ZMA. 19 ♂ paratypes, Makedonia, Dráma district, Mt. Falakró, all Coutsis leg. et coll., of which: 9 specimens 1300 m, 6.viii.1981, 3 specimens 1200–1300 m, 10.vii.1993, 1 specimen 1600–1900 m, 6.viii.1999, 3 specimens eastern foothills, near Granitis, ca. 600 m, 7.vii.2001, 2 specimens same data, but 7.viii.1999 and 1 specimen same data, but 600–700 m, 6.viii.1999. 3 ♀ paratypes, Makedonia, Dráma district, Mt. Falakró, 1300 m, 6.viii.1981, Coutsis leg. et coll.

Description. Holotype (Figs. 1, 2). FW length 16.0 mm. Upper-side: as in *aroaniensis*; ground colour dark brown with a slight yellowish sheen, which under certain lighting conditions may make sub-marginal area of both FW and HW appear darker than rest of wing; when held against light, wings not translucent, being similar to those of *aroaniensis*, and differing from those of *Polyommatus (Agrodiaetus) ripartii* (Freyer, 1830) and *Polyommatus (Agrodiaetus) nephohiptamenos* (Brown & Coutsis, 1978), both of which show mild translucence; wing veins blackish-brown, but not as evident as in *ripartii* and *nephohiptamenos*, because of the lack of wing translucence; FW basal, discal and part of post-discal area covered with dense dark brown hairs that are somewhat lighter than the ground-colour; FW blackish stria at cell-apex barely visible; inner half of fringes of FW blackish-brown, outer half brown, while on HW inner half of fringes blackish-brown and outer half whitish-brown. Underside: as in *aroaniensis*, but ground-colour darker yellow-brown with a reddish tinge, giving an overall warmer appearance; HW black post-discal spots small, sub-marginal markings vestigial, and whitish stripe weakly developed; FW fringes with light brown inner half and blackish-brown outer half; HW fringes with light brown inner half and brown outer half; base of HW devoid of any greenish- or bluish-silver dusting, even when observed microscopically.

♀ paratype (Figs. 10, 11). FW length 16.1 mm; upper-side as in ♂, but ground-colour lighter dark brown and lacking the yellowish sheen, FW blackish stria at cell-apex better defined, FW hairs missing, and fringes of both wings lighter-coloured; dark brown sub-marginal area darker than ground-colour, as in ♂, but narrower; HW with blackish-brown sub-marginal markings. Underside, as in male, but fringes lighter-coloured, HW whitish stripe slightly better defined, and both wings with bare traces of sub-marginal orangey-brown spots.

Variation (Figs. 14–17). This is expressed in the males by their overall size (FW length: minimum = 14.1 mm, maximum = 17.3 mm, and average for 20 specimens studied = 16.4 mm), by the shade and intensity of ground-colour on underside (light yellow-brown with slight reddish tinge to darker yellow-brown with more intense reddish tinge, depending on the freshness of the specimens), by the degree of definition and the size of the HW post-discal black spots on underside, as well as by the degree of definition, or total absence, of the HW underside whitish stripe (about 60% out of 20 ♂ specimens studied were found

to be totally un-striped, while 40% were found to carry a stripe in varying degrees of definition, but never as well defined as in *ripartii*). In the 4 available females variation is expressed as it is in the males, but the FW length was found to have a minimum value of 14.0 mm, a maximum one of 16.2 mm, and an average one of 15.6 mm, while one of the studied specimens was found to be un-striped and the other three, to possess a whitish stripe that is slightly better defined than in the males. Variation in the females is also expressed by the degree of definition of the underside orangey-brown sub-marginal spots, the degree of definition and number of the HW upper-side sub-marginal dark brown markings, as well as by the shape of the wings, that most often tend to be narrower than in the ♂.

Male genitalia (Figs. 4–8). Indistinguishable from those of *aroaniensis*, sharing with the latter the long valvae that are also characteristic of *Polyommatus (Agrodiaetus) humedasaе* (Toso & Balletto, 1976), *Polyommatus (Agrodiaetus) alcestis* (Zerny, 1932), *Polyommatus (Agrodiaetus) fabressei* (Oberthür, 1910), nominotypical *Polyommatus (Agrodiaetus) dantchenkoi* (Lukhtanov, Wiemers & Meusemann, 2003), *Polyommatus (Agrodiaetus) dantchenkoi orphicus* Kolev, 2005 and *Polyommatus (Agrodiaetus) admetus* (Esper, [1783]).

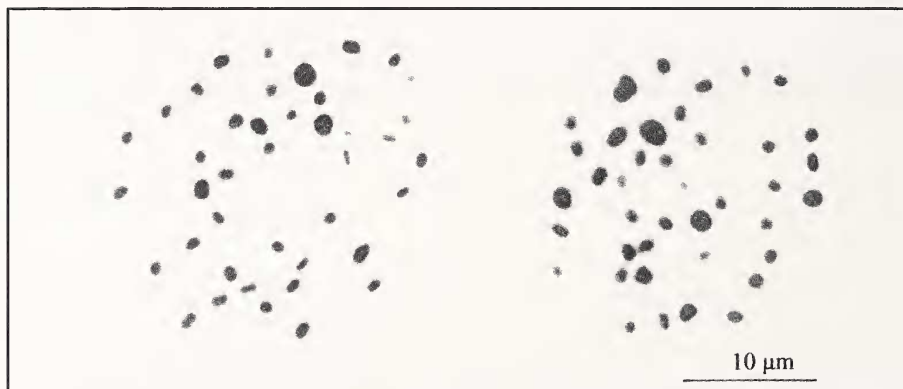


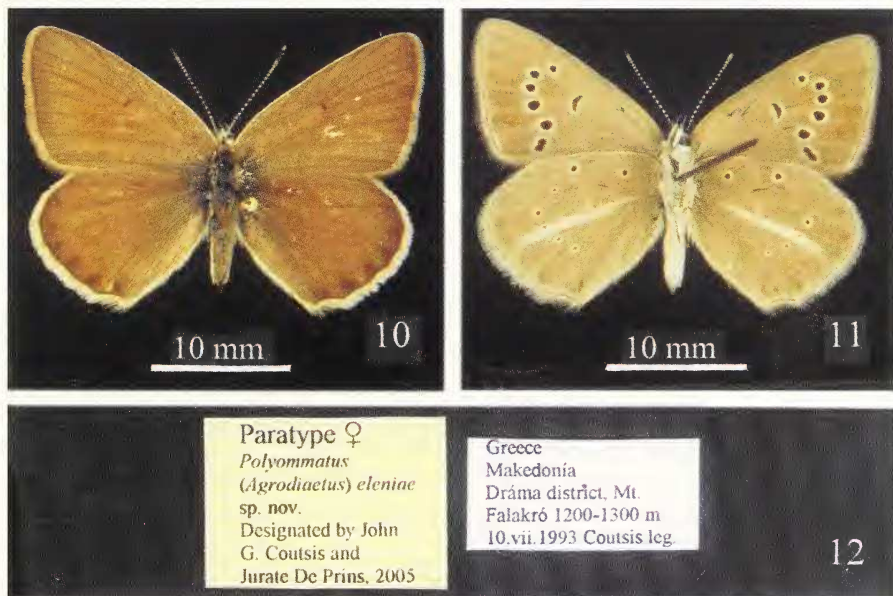
Fig. 9. Spermatocytes in MI of holotype (white stripe on HW underside present). Chromosome preparation No. JC 99032. – $n = 41$.

Chromosome number and karyotype (Fig. 9). Preparation method according to Wiemers & De Prins (2004). There were found 15 cells in MI (2 are figured) and 3 cells in MII, each with $n = 41$, this value being significantly lower than that of *aroaniensis*, which has $n = 48$ (Coutsis, Puplesiene & De Prins 1999), extremely lower than that of *fabressei*, which has $n = 90$ (De Lesse, 1960), higher than that of *humedasaе*, and *alcestis* which have respectively $n = 39$ (Troiano *et al.* 1979) and $n = 19$ –21 (De Lesse 1960), and about equal to that of the geographically distant nominotypical *dantchenkoi*, and to that of the geographically proximate *dantchenkoi orphicus*, the first one of *Phegea* 33 (4) (1.XII.2005): 132

which has $n = 40-42$, and the second one has $n = 41-42$ (Lukhtanov *et al.* 2003 and Kolev 2005, respectively), and both of which differ, however, from *eleniae* by their karyotype as well as by underside external characters that seem to bear close affinities to those of *ripartii*. The karyotype of *eleniae* is asymmetrical and is characterized by having 4 large bivalents, and another 37 smaller ones that show a gradual decrease in size, but not quite as gradual as in *aroaniensis*. From nominotypical *dantchenkoi* and its ssp. *orphicus* it differs by the length of the smallest chromosome versus that of the largest one, the smallest one being about 1/3 the length of the largest one in *eleniae*, and about 2/3 this length in nominotypical *dantchenkoi* and its ssp. *orphicus*.

Distribution. The new species-group taxon is presently known only from Mt. Falakró and its immediate surroundings (Fig. 22). Specimens from the geographically proximate Mt. Menikio and Mt. Órtilos appear also to belong to *eleniae*, but their taxonomic status will remain uncertain until an examination of their respective chromosome number and karyotype is also carried out.

Derivatio nominis. The specific name given is derived from the first author's wife, 'Eléni', who has patiently and silently endured his lepidopterological monomania for a period of over 40 years.



Figs. 10–12. *Polyommatus (Agrodiaetus) eleniae* sp. nov. paratype ♀. 10.– Upper-side. 11.– Underside. 12.– Data labels.

Supplementary chromosomal evidence

As a measure of verification, a second specimen from the type series of *eleniae* was checked, and it too revealed in all five of its MI spermatocytes that were studied (four are shown in Fig. 13), exactly the same karyotype and number of chromosomes ($n = 41$) as did the holotype. This time the specimen chosen was one that totally lacked the HW underside whitish stripe, and this was done in order to preclude any possible doubts about the con-specificity of the striped and un-striped forms of the new species.

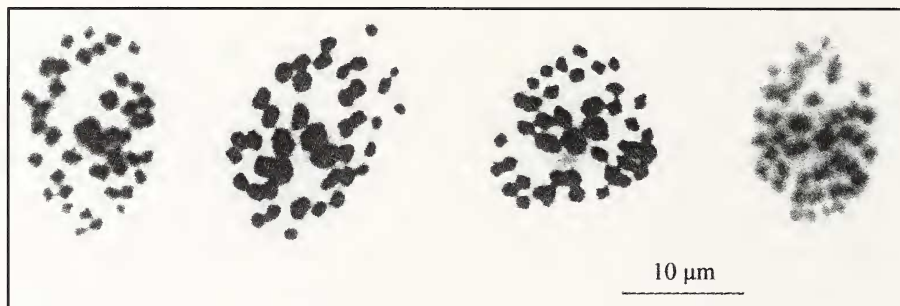
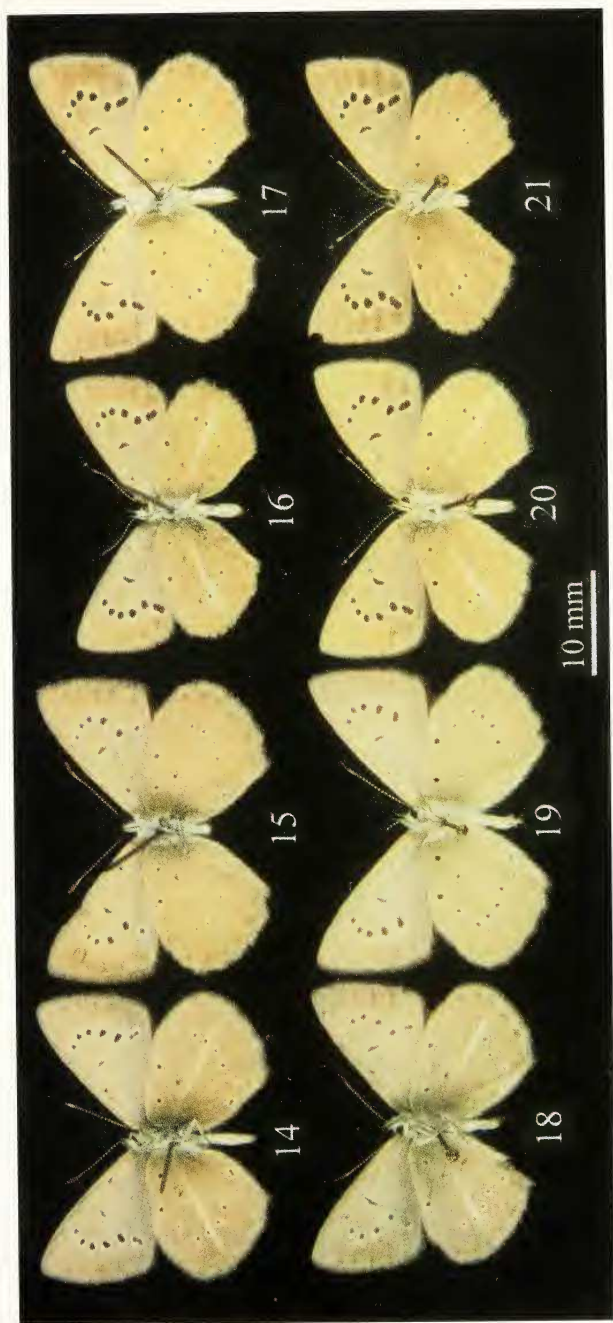


Fig. 13. Spermatocytes in MI of paratype (white stripe on HW underside absent). Greece, Makedonía, Dráma district, Mt. Falakró, 1600–1900m, 6.viii.1999, Coutsis leg. Chromosome preparation No. JC 99041. — $n = 41$.

Discussion

The difference in chromosome number from *aroaniensis* ($n = 48$), being a constant 7, is quite high in respect of the overall low number of chromosomes involved here. No definable external differences occur however between the newly described species and *aroaniensis*, other than the darker, warmer and redder underside ground colour of the former (Figs. 14–21). Using independent sample two-tailed t-test, we were not able to establish statistically significant differences between *eleniae* and topotypical *aroaniensis* in the mean value of their respective FW lengths. Application of an χ^2 test revealed that no statistically significant difference occurs between *eleniae* and topotypical *aroaniensis* in the frequency of the presence of the HW underside whitish stripe.

As mentioned above, the recently described *P. (A.) dantchenkoi*, both in its nominate form, as well as in its ssp. *orphicus*, though sharing with *eleniae* the same chromosome number, does however differ from the latter by its karyotype, as well as by the external characters of the underside, these being very close instead to those of *ripartii* (whitish stripe always present and well-defined, ground-colour of a lighter, colder hue, without reddish tinge). The chromosome number of *humedasaе*, being $n = 39$, is closer to that of *eleniae* than is that of *aroaniensis* to that of *eleniae*, but the existence of external differences between the first two, supports specific differentiation between them.



Figs. 14–21. Undersides of *Polyommatus (Agrodiaetus)* species from Greece, Coutsis leg. 14–17. Paratypes of *eleriae* sp. nov., Makedonia, Dráma district, Mt. Falakró. 14.–♂, eastern foothills, near Granitis, ca. 600 m, 7.vii.2001 (HW white stripe present). 15.–♂, 1300 m, 6.viii.1981 (HW white stripe absent). 16.–♀, same data (HW white stripe present). 17.–♀, same data (HW white stripe vestigial). 18–21. *arocianensis* (Brown, 1976), Pelopónnisos, Ahaia district, Mt. Helmós (= TL). 18.–♂, 1100 m, 4.vii.1980 (HW white stripe present). 19.–♂, same data (HW white stripe vestigial). 20.–♀, 1400 m, 24.vii.1971 (HW white stripe present). 21.–♀, same data (HW white stripe vestigial).

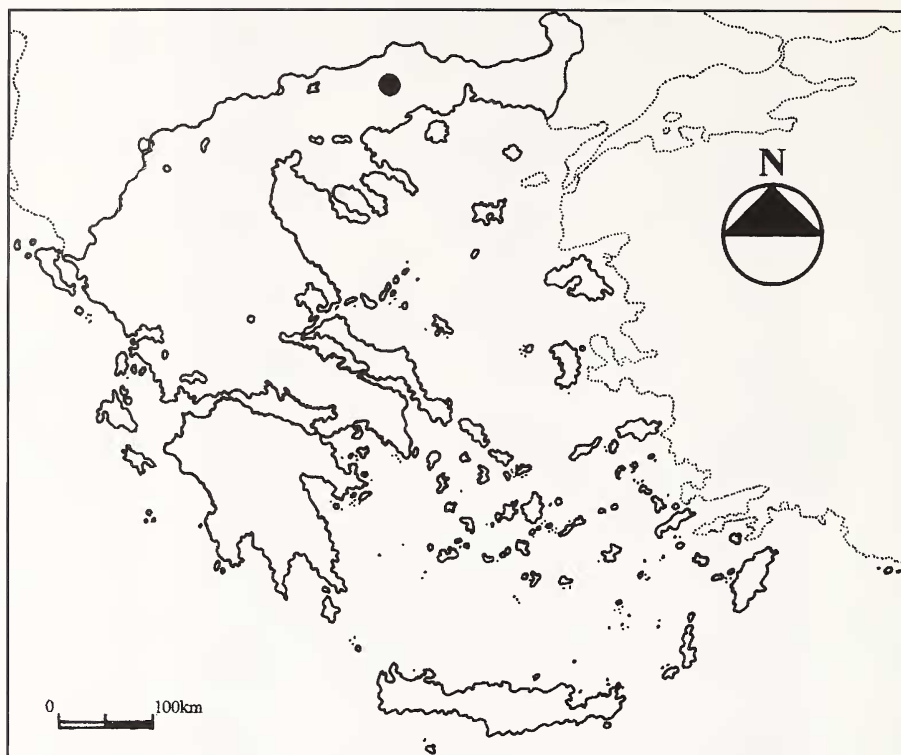


Fig. 22. Map of Greece showing sampling locality for *P. (A.) eleniae* sp. nov.

It is hoped that in due time the chromosome number of *aroaniensis* species-group taxa from various other localities on the Greek mainland will also have their chromosomes studied, in order to acquire a broader overview of this taxonomically difficult and complex group of butterflies.

References

- Brown, J. 1976. Notes regarding previously undescribed European taxa of the genera *Agrodiaetus* Hübner, 1822 and *Polyommatus* Kluk, 1801 (Lep., Lycaenidae). — *Entomologist's Gazette* 27: 77–84.
- Brown, J. & Coutsis, J. G. 1978. Two newly discovered Lycaenid butterflies (Lepidoptera: Lycaenidae) from Greece, with notes on allied species. — *Entomologist's Gazette* 29: 201–213.
- Coutsis, J. G., Puplesiene, J. & De Prins, W. 1999. The chromosome number and karyotype of *Polyommatus (Agrodiaetus) ripartii* and *Polyommatus (Agrodiaetus) aroaniensis* from Greece (Lepidoptera: Lycaenidae). — *Phegea* 27(3): 81–84.
- De Lesse, H. 1960. Les nombres de chromosomes dans la classification du groupe d'*Agrodiaetus ripartii* Freyer (Lepidoptera Lycaenidae). — *Revue française d'Entomologie* 27(3): 240–264.
- Esper, E. J. C. [1783]. *Die Schmetterlinge in Abbildungen nach der Natur mit Beschreibungen* 1(2) Fortsetzung der Tagschmetterlinge: 148; pl. 82, fig. 2♂, 3♀.

- Kolev, Z. 2005. *Polyommatus dantchenkoi* (Lukhtanov & Wiemers, 2003) tentatively identified as new to Europe, with a description of a new taxon from the Balkan Peninsula (Lycaenidae). — *Nota lepidopterologica* **28**(1): 25–34.
- Lukhtanov, V. A., Wiemers, M. & Meusemann, K. 2003. Description of a new species of the “brown” *Agrodiaetus* complex from South-East Turkey (Lycaenidae). — *Nota Lepidopterologica* **26**(1/2): 65–71.
- Oberthür, Ch. 1910. Notes pour servir à établir la Faune Française et Algérienne des Lépidoptères. Rhopalocera (suite). — *Études de Lépidoptérologie comparée* **4**: 15–638.
- Toso, G. G. & Balletto, E. 1976. Una nuova specie del genere *Agrodiaetus* Hübn. (Lepidoptera Lycaenidae). — *Annali del Museo civico di Storia naturale di Genova* **81**: 124130.
- Troiano, G., Balletto, E. & Toso, G. G. 1979. The karyotype of *Agrodiaetus humedasae* Toso & Balletto, 1976. — *Bollettino della Società entomologica italiana* **111**(7–8): 141–143.
- Wiemers, M. & De Prins, J. 2004. *Polyommatus (Agrodiaetus) paulae* sp. nov. (Lepidoptera: Lycaenidae) from Northwest Iran, discovered by means of molecular, karyological and morphological methods. — *Entomologische Zeitschrift* **114**(4): 155–162.
- Zerny, H. 1932. Lepidopteren aus dem nördlichen Libanon. — *Deutsche entomologische Zeitschrift Iris* **46**: 186–187.
-